DOCUMENT RESUME

ED 347 751 EC 301 367

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TITLE Criteria for Evaluation of Mathematics Programs for Mathematically Gifted Elementary Students.
PUB DATE 87
NOTE 15p.
PUB TYPE Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Ability Identification; *Academically Gifted; Educational Quality; Elementary Education; *Elementary School Mathematics; *Grouping (Instructional Purposes); *Mathematics Instruction; Program Development; *Program Evaluation; Regular and Special Education Relationship; Student Placement; Teaching Methods

ABSTRACT

This paper presents seven basic principles or criteria that mathematics programs for mathematically gifted elementary students should meet. A rationale for each criterion is offered. Grouping these children together in one regular class is strongly encouraged so that they can be in one advanced group, as part of the traditional three groups in elementary classrooms. In low enrollment schools, grouping of mathematically gifted students from several grades together in one class is suggested. The seven program principles are that the mathematics program should: (1) be part of the regular mathematics curriculum; (2) have a rigorous identification procedure; (3) provide daily instruction; (4) include placement and interaction with peers who are also mathematically gifted; (5) involve faster pacing; (6) provide challenges at the student's level using advanced strategies; and (7) offer special training for teachers. (12 references) (DB)

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Criteria for Evaluation of Mathematics Programs for Mathematically Gifted Elementary Students

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CRITERIA FOR GIFTED PROGRAM EVALUATION

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Abstract

Offered are seven basic principles or criteria that mathematics programs for mathematically gifted elementary students should meet. A rationale for each criterion is presented. Advanced groups, as part of the traditional three groups in elementary classrooms, are recommended within which mathematically gifted elementary students could be specially taught. Also recommended is an alternative for low-enrollment schools.

Criteria for Evaluation of Mathematics Programs for Mathematically Gifted Elementary Students

INTRODUCTION

School personnel share in the common purpose of helping gifted mathematics students develop to their fullest potential in a secure, stimulating, and rewarding environment through an excellent gifted program for them. As a part of this group, teachers of the mathematically gifted also share in this common purpose. However, the lack of information and criteria hinder these teachers and they are at a loss to determine whether a particular program for the gifted elementary mathematics students is poor, average or excellent.

There exists a minimal set of essential principles or criteria that gifted programs for elementary mathematics students should meet (Belcastro, 1987). Using these criteria, teachers of mathematically gifted children should be able to evaluate the particular program offered by their school system to determine whether it is minimally adequate.

SEVEN BASIC PRINCIPLES

Following are the seven basic criteria in question form that programs for mathematically gifted students should meet.

1. Is the program for gifted elementary students in mathematics part of the regular curriculum?

The gifted program should be based in students' subject area, which is mathematics. It should not be a gifted program in general where mathematics is lost among other activities. The delivery systems for this program may differ, e.g., mentor, independent study, grouping within classes, but it should originate and be offered through the academic area. Articulation and integration with the school curriculum are a necessity for this program rather than being an addition to it. A serious program for mathematically gifted elementary students is not under the direction of a resource-room or learning-center teacher, but under the guidance of a teacher who has an assignment in the regular elementary curriculum and has a mathematics specialty. Within the framework of the regular curriculum, this teacher has the responsibility for the education of the mathematically gifted.

2. Is there a rigorous identification procedure?

In the elementary school, groups of highly homogeneous students should be formed in each of the areas of: general intellectual aptitude, specific academic aptitude, creativity, leadership ability, and visual and performing arts. To accomplish this, the gifted program should utilize a rigorous identification procedure.

That gifted students should be identified primarily by their unique type of giftedness appears most reasonable and sensible: the gifted in leadership should be those high in leadership ability; the mathematically gifted should be those high in mathematics ability. Although the mathematics achievement test for mathematically gifted elementary students should be only one of many criteria for identifying them, it still remains the foremost criterion for what is called giftedness in mathematics.

The lowest acceptable score in the selection process should be the score that identifies the top 5% in the area of mathematics. The other criteria in the process would provide the flexibility needed for proper selection: I.Q. score, reading achievement score, peer nomination, teacher nomination, parent nomination and self nomination.

3. Is the program in effect every day?

The giftedness of students in the area of mathematics is an omnipresent ingredient and must be stimulated every day and not just once or twice a week. Thus, the program for mathematically gifted elementary students should be in effect every day. When daily contact is not present, the mathematically gifted lose out on: constant interaction with and attachment to a teacher of the mathematically gifted that only can be brought about through sustained daily contact; the contagious enthusiasm, inspiration, and love for mathematics by peers and teachers that can be achieved only through a sufficient amount of continuous time; and the absorption and joy of moving ahead rapidly in mathematics or delving deeply in it. Note that the pull-out program does not usually meet this criterion.

4. Does the program provide placement and interaction with peers who are mathematically gifted?

Mathematically gifted elementary students should not be placed with students who are average or above-average in mathematics but in groups with other mathematically gifted students. Thus, the gifted program would provide them with interactive opportunities.

The gap between average mathematics students and gifted mathematics students becomes greater and is noticed more as the gifted get older. The mathematically gifted will be forced to review skills and materials in their mathematics groups that they had overlearned two and three years before unless some special placement is provided for them (Gallagher, 1985).

The mathematically gifted would discover, after placement, that they are not odd or uniquely different and that others have similar feelings, interests, problems, and goals. During interaction, they would experience the joy and excitement of displaying mathematical skills or of intellectual stimulation that only other mathematically gifted students can provide. More importantly, they need to be with those who can follow their ideas, share their exhilaration, and who can accept their ways of learning mathematics.

5. Is faster pacing of the mathematics group facilitated?

As research has shown, the gifted need less time than others in order to learn information (Keating, 1976; Keating, 1979; Stanley, Keating, & Fox, 1974; Whitlock, 1978). Additionally, Maker (1982) notes that the distinctive qualities of gifted students suggest that they need less data and fewer learning

experiences in order to be able to understand abstract ideas. Mathematically gifted elementary students, because they learn faster, should not be subjected to questions on the obvious, constant repetition, more problems to cover, and lesson plans intended for students average in mathematics. Therefore, the program for mathematically gifted elementary students should be certain that the pace of activities, groups or learning situations matches the learning rate of the mathematically gifted students involved.

6. Are students challenged at their own level using advanced strategies?

The mathematics curriculum designed for mathematically gifted elementary students should be different from the mathematics curriculum offered other students. It should pay greater attention to advanced skills and techniques and advanced conceptualizations that by definition cannot be easily understood by students of similar age but of average or below-average ability in mathematics.

Further, the teachers of the mathematically gifted must present mathematical content on higher levels of abstraction and in more complex form than is done for students average in

mathematics. The program for the mathematically gifted should challenge them at their own levels in mathematics.

7. Are teachers selected who are trained in the education of the mathematically gifted?

June Maker (1975), in her research review, recommends that the minimum criteria for the selection of a teacher be "an ability to relate effectively to the particular group of youngsters one is planning to teach" and "an openness to change." Further, teachers of the mathematically gifted should be student directed, have self-confidence, be accepting, be flexible, and have a high degree of skill in mathematics. The research by Gallagher, Aschner, & Jenne (1967) clearly showed that students seldom change from either the level or type of thinking process or skill acquisition that the teacher requests.

Research on the effectiveness of different methods and approaches to teaching has shown repeatedly that the teacher is the single most important variable in determining the success of an approach (Callahan & Renzulli, 1977; Dunkin & Biddle, 1974; Gage & Berliner, 1979).

It is axiomatic that the program for mathematically gifted elementary students select teachers for the mathematically gifted

who have been thoroughly trained in both gifted education and mathematics and who are temperamentally suited to interact with gifted students. Volunteering to be a teacher of the mathematically gifted is not enough. Unless teachers of the mathematically gifted meet the above criteria, the mathematics program for the mathematically gifted will lack proper structure, planning, direction, and resources and will not achieve its potential. It will be a program for the mathematically gifted in name only.

RECOMMENDATIONS

For the mathematically gifted, the best kind of program would be one which meets the seven criteria listed earlier. Consideration should be given to placing together within each grade all the mathematically gifted elementary students. They become the advanced mathematics group of the traditional three groups in only one of the classes of each grade, with that teacher trained in both gifted education and mathematics. The teacher paces these students faster through mathematics, challenges them at their own levels, and develops those general processes, strategies, and skills, such as creative and productive thinking, associated with programs for the mathematically gifted. This

group would meet every day for mathematics. In all other respects, they would be part of the regular class, including being part of different subject-matter groupings during other parts of the day. Delivery systems would include the group as a whole, subgroups and individual study and would be limited by the time allotted for mathematics in the daily class schedule; work with mentors and activities outside the school would be by special arrangement as planned by a creative teacher.

A variation accommodates rural elementary schools and those with low enrollments. All of the mathematically gifted from several grades would form a group and become the advanced mathematics group of the traditional three groups in a selected class. This group would operate under the same conditions and requirements as the group mentioned above, except that they would disperse at the end of the mathematics period each day to their original classrooms. For very small schools, only one or two students would be members of the advanced group. A necessity would be the thorough preparation of the mathematically gifted students, regular students, parents, and the community for this curricular and administrative change.

The most critical task in providing for the rural mathematically gifted is the selection and training of teachers who work with these students (Witters & Vasa, 1981) along with the professional preparation and frequent inservice training of those rural teachers of the mathematically gifted elementary students (Witters, 1979).

A major advantage of these advanced groups is that they reduce the difference among students in mathematical ability and interest. Instruction and learning in these groups can be accomplished with little risk of losing some students or leaving others unchallenged.

A major disadvantage of these advanced groups is that of coordinating the schedules of the classes involved so that the mathematically gifted could meet as a group.

Teachers and parents should be polite but firm in their insistence that the programs for the mathematically gifted in their schools meet the minimal criteria listed above. At stake are not only the futures of their mathematically gifted children, but also the intellectual, emotional, and social well-being of these children as well.

Belcastro, F. P. (1987). Elementary pull-out program for the intellectually gifted--boon or bane? Roeper Review, 9(4), 208-212.

Callahan, C. M., & Renzulli, J. S. (1977). The effectiveness of a creativity training program in the language arts. Gifted Child Quarterly, 4, 538-545.

Dunkin, M. J., & Biddle, B. J. (1974). The study of teaching. New York: Holt Rinehart Winston.

Gage, N. L., & Berliner, D. C. (1979). Educational psychology. Chicago: Rand McNally.

Gallagher, J. J. (1985). Teaching the gifted child (3rd ed.). Boston: Allyn & Bacon.

Gallagher, J. J., Aschner, M. J., & Jenne, W. (1967). Productive thinking in classroom interaction. Reston, VA: Council for Exceptional Children.

Keating, D. P. (1976). Intellectual talent: Research and development. Baltimore: John Hopkins University Press.

Keating, D. P. (1979). Secondary school programs. In A. H. Passow (Ed.). The gifted and talented (pp. 186-198). Chicago: University of Chicago Press.

Maker, C. J. (1975). Training teachers for the gifted and talented: A comparison of models. Reston, VA: Council for Exceptional Children.

Stanley, J. C., Keating, D. P., & Fox, L. H. (Eds.). (1974). Mathematical talent: Discovery, description and development. Baltimore: John Hopkins University Press.

Whitlock, B. W. (1978). Don't hold them back: A critique and guide to new high school-college articulation models. New York: College Entrance Examination Board.

Witters, L. (1979). The needs of rural teachers in gifted education. Journal for Education of the Gifted, 3, 79-82.

Witters, L. A. & Vasa, S. F. (1981). Programming alternatives for educating the gifted in rural schools. Roeper Review, 3(4), 22-24.